Effect of Scrotal Veins Ligation on Results of Varicocelectomy Regarding Semen Parameters and Testicular Volume

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Abstract

Background: There was disagreement in some studies about the benefit of varicocele treatment on testicular size.

Objective: The aim of this study was to evaluate scrotal veins contribution to varicocele and the effect of its ligation on semen parameters and testicular volume.

Patients and Methods: Sixty patients with clinically and sonographically detectable varicocele grades II and III, and abnormal semen were randomly divided into 2 equal groups: Group I were treated by subinguinal varicocelectomy only, and Group II were treated by subinguinal varicocelectomy with additional scrotal veins ligation. They were subjected to semen analysis and scrotal color Duplex to measure testicular size.

Results: Both surgical techniques showed significant improvement in semen parameters (count and motility) and testicular volume measured by Duplex. However, the postoperative improvement in sperm count and testicular volume was significantly higher in Group II. Postoperative pregnancy rates were comparable with no significant difference between both groups.

Conclusion: The postoperative improvement in sperm count and testicular volume was significantly higher in patients treated by subinguinal varicocelectomy with additional scrotal veins ligation.

Key Words: Varicocele – Scrotal Duplex – Semen analysis – Subinguinal varicocelectomy – scrotal veins.

Introduction

VARICOCELES are found in approximately 15% of the male population, in 35% of men with primary infertility and in up to 75% of men with secondary infertility [1]. The ideal method for treatment of varicocele is still controversial [2]. There are several therapeutic proposals for varicocele treatment. Subinguinal interruption of dilated veins in adolescent varicocele is an effective treatment and should be considered a gold standard technique [3,4]. Delivery of the testis assures direct visual access to all possible routes of venous return, including external spermatic (cremasteric) and gubernacular veins [5].

Schauer et al., [6] documented significant and comparable improvements in sperm concentration and motility, regardless of surgical technique. Similar improvements in postoperative semen parameters have been reported by others [7-9].

There was disagreement in some studies about the benefit of varicocele treatment on testicular size [10,11].

The aim of the work was to determine the effect of scrotal veins ligation on the results of varicocelectomy regarding the effect on semen parameters and testicular volume measured by Duplex.

Patients and Methods

This prospective study was done over a period of 21 months, from December 2011 to September 2013. Sixty patients with varicocele of those attending the Andrology Outpatient Clinic, Kasr El-Eini Hospital, Cairo University were randomly assigned to two surgical treatment modalities. Selection criteria were: Clinically detectable varicocele grades II, III [12] and abnormal semen parameters regarding sperm count, motility and abnormal forms. Exclusion criteria were: Patients with hypogonadal features, abnormal hormonal profile (FSH and LH), obstructive azoospermia, pyospermia. History of testicular trauma, inflammation or malignancy. The recruited 60 patients were randomly divided into 2 equal groups:

• Group I: Were treated by subinguinal varicocelectomy only [13]; 25 bilateral and 5 left unilateral varicoceles.
• Group II: Treated by subinguinal varicocelectomy [13] with additional scrotal veins ligation, including external spermatic (cremasteric) and gubernacular veins; 27 bilateral and 3 left unilateral varicoceles.

All patients were subjected before the operation to history taking, clinical examination and laboratory investigations: Semen analysis [14], hormonal analysis (FSH, LH and PRL) by using chemoluminescent immunometric assay (IMMULITE) and Radioimmuno-Assay (RIA); only done for cases of oligozoospermia, with sperm count <10 million/ml to exclude abnormal hormonal profile. Scrotal color Duplex was done to measure testicular size and varicocele grade.

Follow-up at 1 week interval and 4-6 months postoperatively by clinical examination, scrotal duplex examination and semen analysis, to detect complications and compare Duplex changes and semen parameters.

Statistical analysis: Paired t-test was used for dependent variables. Cross tables and Chi-square tests were performed to compare ordinal data. Statistical analysis was done using SPSS 14.0 for Windows. Significant: $p$-value $>0.05$, insignificant: $p$-value $<0.05$.

Results

The mean age ± S.D. of the studied groups was 29.40±4.41 years with a range of 22-38 years in Group I, and 30.03±4.77 years with a range of 23-41 years in Group II (Table 1).

Table (1): Age and duration of infertility of studied groups in years (Mean ± S.D).

<table>
<thead>
<tr>
<th>Parameter Groups</th>
<th>Group I</th>
<th>Group II</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>29.40±4.41</td>
<td>30.03±4.77</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td>(n=60)*</td>
<td>(n=30)</td>
<td></td>
</tr>
<tr>
<td>Duration of infertility</td>
<td>3.23±2.03</td>
<td>3.58±2.89</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>in years (n=56)</td>
<td>(n=28)</td>
<td>(n=28)</td>
<td></td>
</tr>
</tbody>
</table>

*: 4 cases were single, in addition to 56 infertility cases.

Patients with varicocele included in the present study were 60 cases: Infertile patients (56 cases); secondary infertility was present in only 4 cases (6.67%), while 52 cases (86.66%) were having primary infertility. The remaining 4 cases (6.67%) were single (Table 2). Each of the studied groups included: 26 primary infertile, 2 secondary infertile and 2 single patients.

Table (2): Type of infertility in the studied groups.

<table>
<thead>
<tr>
<th>Number</th>
<th>Type of infertility</th>
<th>Primary infertility</th>
<th>Secondary Single infertility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cases (56 cases)*</td>
<td>52</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Percent of total (60 cases)*</td>
<td>86.66%</td>
<td>6.67%</td>
<td>6.67%</td>
</tr>
</tbody>
</table>

*: 4 cases (6.67%) were single, in addition to 56 infertility cases.

The duration of infertility of the tested groups was 3.23±2.03 years with a range of 1-10 years in Group I and 3.58±2.89 years with a range of 1-10 years in Group II. No significant difference between Groups I and II was observed regarding age and infertility duration. (Table 1).

Postoperative mean sperm count was significantly increased in both Groups I and II. The postoperative increase in sperm count was significantly higher in Group II. There was no significant difference between both groups preoperatively (Table 3).

Table (3): Pre-and postoperative sperm count in million/ml (Mean ± S.D) in the studied groups.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (n=30)</td>
<td>20.37±19.93</td>
<td>30.87±18.03</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>II (n=30)</td>
<td>19.52±18.24</td>
<td>39.27*** †</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>$p$-value</td>
<td>&gt;0.05</td>
<td>&lt;0.05</td>
<td></td>
</tr>
</tbody>
</table>

*: Significant difference compared to preoperative groups.
†: Significant difference between postoperative groups.
*: Insignificant difference between preoperative groups.

Three cases in Group I and one case in Group II were azoospermic, and were confirmed to be non-obstructive through diagnostic testicular biopsy. No sperms appeared in their follow-up semen analysis.

Postoperative mean percent of sperm motility and active progressive motility was significantly increased in both Groups I and II. There was no significant difference between preoperative groups or between postoperative groups (Tables 4,5). The postoperative mean percent of morphologically abnormal sperm was significantly decreased in Group II. There was no significant difference between preoperative groups or between postoperative groups (Table 6).

Table (4): Pre and postoperative percent of sperm motility (mean ± S.D) in non-azoospermic patients for Groups I and II (n=56) †.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (n=27)</td>
<td>35.37±18.60</td>
<td>47.59*** †</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>II (n=29)</td>
<td>34.31±16.40</td>
<td>48.27*** †</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>$p$-value</td>
<td>&gt;0.05</td>
<td>&gt;0.05</td>
<td></td>
</tr>
</tbody>
</table>

†: 4 cases were azoospermic patients.
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Table (5): Pre and postoperative percent of active progressive motility (mean ± S.D) in non-azoospermic cases for Groups I and II (n=56) †.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (n=27)</td>
<td>6.85±6.67</td>
<td>11.30±7.54</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>II (n=29)</td>
<td>5.52±6.03</td>
<td>14.66±8.65</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

†: 4 cases were azoospermic patients.

Five pregnancies (17.86%) occurred in Group I. Six pregnancies (21.4%) occurred in Group II. There was no significant difference in reported pregnancy rate during the follow-up period between both groups.

Postoperative mean left testicular volume in Group II and mean right testicular volume in Group I and II were significantly increased [(Table 7), Fig. (1)]. The postoperative increase in mean left and right testicular volume in Group II was significantly higher than corresponding in group. No significant difference between preoperative groups was found (Table 7).

Table (6): Pre and postoperative percent of morphologically abnormal sperms (mean ± S.D) in non-azoospermic cases for Groups I and II (n=56) †.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (n=27)</td>
<td>36.11±11.12</td>
<td>31.85±9.0</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>II (n=29)</td>
<td>40.69±13.28</td>
<td>33.45±8.36</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

†: 4 cases were azoospermic patients.

Table (7): Pre-and post operative left and right testicular volume in ml (Mean ± S.D) measured by Duplex for Groups I and II.

<table>
<thead>
<tr>
<th>Testicular volume (ml)</th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left side:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group I</td>
<td>10.49±3.08</td>
<td>11.70±2.84</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Group II</td>
<td>11.49*±3.28</td>
<td>13.19*±2.22</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Right side:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group I</td>
<td>11.52±3.39</td>
<td>13.34*±2.98</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Group II</td>
<td>12.58*±3.52</td>
<td>14.51*†±2.93</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

*: Significant (p<0.05) compared to preoperative.
†: Significant (p<0.05) compared to postoperative Group I.
•: Insignificant difference between preoperative groups (p>0.05).

Fig. (1): Effect of subinguinal varicocelectomy with additional scrotal veins ligation (Group II) on the right testicular volume measured by Duplex. (A) Preoperative: 11 ml. (B) Postoperative: 15.3ml.

Discussion

Varicocele is approached by various interventional techniques, none of which is yet considered the best. Some are relatively expensive, time-consuming and require special skills and training. Each technique has its own advantages and disadvantages, and conflicting results have been obtained from different studies [15]. The ideal method for treatment of varicocele is still controversial [2].

The subinguinal approach has the advantage of causing less pain because less muscle is involved [16] and allows for ligation of vessels before branching or crossing over [17]. Delivery of the testis assures direct visual access to all possible routes of venous return, including external spermatic (cremasteric), and gubernacular veins [5].

Most studies suggest that varicocele ligation results in significantly improved semen parameters [17]. Several studies demonstrated positive effects of different varicocele surgical interventions on sperm parameters including count, motility and morphology. Kibar et al., [18] compared semen parameters before and after varicocelectomy. They found that surgical correction of varicocele was associated with significant improvement in sperm...
density and sperm motility. Their results showed a significant improvement in sperm concentration 3 months postoperatively. Also, Al-Bakri et al., [19] reported that semen parameters improve by 3 months following varicocelectomy, with little additional improvement thereafter.

Two studies compared inguinal varicocelectomy, laparoscopic and microscopic varicocelectomies; in the study by Al-Kandari et al., [15] an improvement in sperm motility and/or concentration of sperm was found, while in the study by Al-Said et al., [20] improvement in sperm morphology in addition was found. Our study showed significant improvement in sperm count and motility for both groups I and II. The sperm count was significantly higher in Group II. Abnormal sperm forms were significantly reduced in Group II.

Regarding the pregnancy outcome after varicocelectomy, Pasqualotto et al., [21] found that varicocelectomy improved pregnancy outcome in patients with maturation arrest. Successful treatment of varicocele may lead to improvement in semen quality and pregnancy rate in 10-40% [22-25]. Our results showed that pregnancy rate in Group I and II were 17.86%, 21.4%, respectively with no significant difference between both groups although follow-up period was short.

There was disagreement in some studies about the benefit of varicocele treatment on testicular size [10,11,26]. The mean volume of the left and right testicle increased in 28 patients underwent varicocelectomy, and had a testicular histology diagnosis of germ-cell aplasia. The mean sperm concentration increased in these patients after the intervention [21]. Zucchi et al., [27] demonstrated a positive effect of varicocelectomy (traditional surgery) on testicular volume, this effect significantly correlated with total sperm count. Sakamoto and colleagues [28] noted that varicocele repair in adults with a clinical left varicocele increased left testicular volume and improved semen profiles. Sakamoto et al., [29] concluded that testicular volume increase was associated with improvement in semen parameters such as sperm density and motility. They showed an increase in both right and left testicular volumes following varicocele repair.

Varicoceles are associated with smaller ipsilateral testes in both adolescents and adults [10]. The loss of testicular volume in the presence of varicocele is related to the loss of seminiferous tubule elements and decrease in tubular diameter, which may lead to the higher incidence of subfertility and abnormal seminal parameters [30]. Studies in adults have demonstrated increased testicular size after varicocele repair, as measured with conventional methods of calipers or orchidometry [21,31,32]. The outcome differences from some studies of varicocelectomy may be due to the way by which testicular volume was measured. Zucchi et al., [27] and Sakamoto et al., [29], and in the present study, testicular volume was calculated with a formula that is based on ultrasound measurements. Scrotal ultrasonography is generally considered the most accurate way to measure testicular volume [28].

The results of Zucchi et al., [27] and Sakamoto et al., [28,29] are consistent with those from our study, in which testicular volume increase was associated with significant improvement in semen parameters. We observed significant increase in the mean left testicular volume of Group II and mean right testicular volume of Group I and II. The postoperative increase in testicular volume was significantly higher in Group II than I on both sides.

Conclusion:
Both surgical techniques showed significant improvements in semen parameters (count and motility) and testicular volume. However, the postoperative improvement in sperm count and testicular volume was significantly higher in patients treated by subinguinal varicocelectomy with additional scrotal veins ligation. Postoperative pregnancy rates were comparable with no significant difference between both groups.

References
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ملخص المقال:

خلفية البحث: تتمثل فوائد إجراء علاج دوالي الخصية في تحسين النتائج ونوعية الحركة السليمة. المرضى الذين يعانون من هذه الإصابة يعانون من تأثيرات سلبية على نمو الطفولة وصحة الأسرة. بحثنا اليوم يتعلق بدراسة تأثير علاج دوالي الخصية على نتائج علاج دوالي الخصية ونوعية الحركة السليمة.

الهدف من البحث: نسعى إلى دراسة تأثير علاج دوالي الخصية على نتائج علاج دوالي الخصية ونوعية الحركة السليمة.

البحث:

تم إجراء الدراسة على 102 مريضًا، تم تقسيمهم إلى مجموعتين: المجموعة الأولى، حيث تم علاج دوالي الخصية بالхаصلات، والمجموعة الثانية، التي تم فيها علاج دوالي الخصية بالفطريات. تم ملاحظة التأثيرات الطبية على النتيجة الإنجابية في كلتا المجموعتين، ونجد أن المجموعة الأولى، حيث تم استخدام الفطريات، عرضت أحسن نتائج في نمو الطفولة وصحة الأسرة. بسبب التأثيرات الطبية المتعلقة بالفطريات، نجد أن المجموعة الثانية، حيث تم استخدام الحاصلات، عرضت أسوأ نتائج في نمو الطفولة وصحة الأسرة.

الاستنتاج:

لقد ثبت أن استخدام الفطريات هو الخيار المثالي للعلاج، حيث أظهرت نتائج ممتازة في نمو الطفولة وصحة الأسرة. وبناءً على هذه النتائج، نوصى باستخدام الفطريات كعلاج أولوي في علاج دوالي الخصية.